

If you tie up capacity in a given area for hours on end, do you think that phone companies are going to be willing to increase capacity in your area so that you can continue to use their network for virtually nothing? The companies you want to beat out of a few dollars each month are the same ones that are providing your access to the 'Net as well as to the pizza place down the street. If everyone who uses the 'Net "beats" the phone companies out of a few dollars a month, you might feel really proud of yourselves. But we bet that you will be first in line to complain about the degradation in service which will follow closely behind this lost revenue.

### Final Comments

We like getting things for free as much as the next guy, but we also realize that unless companies that are in business to make money can, they won't supply their service or product for long. What is more important—to feel like you have "beaten" someone out of something or have "won" in your effort to get something for nothing, or to have companies out there willing to add capacity and willing to help grow the 'Net and the phone system because they can make some money by doing so?

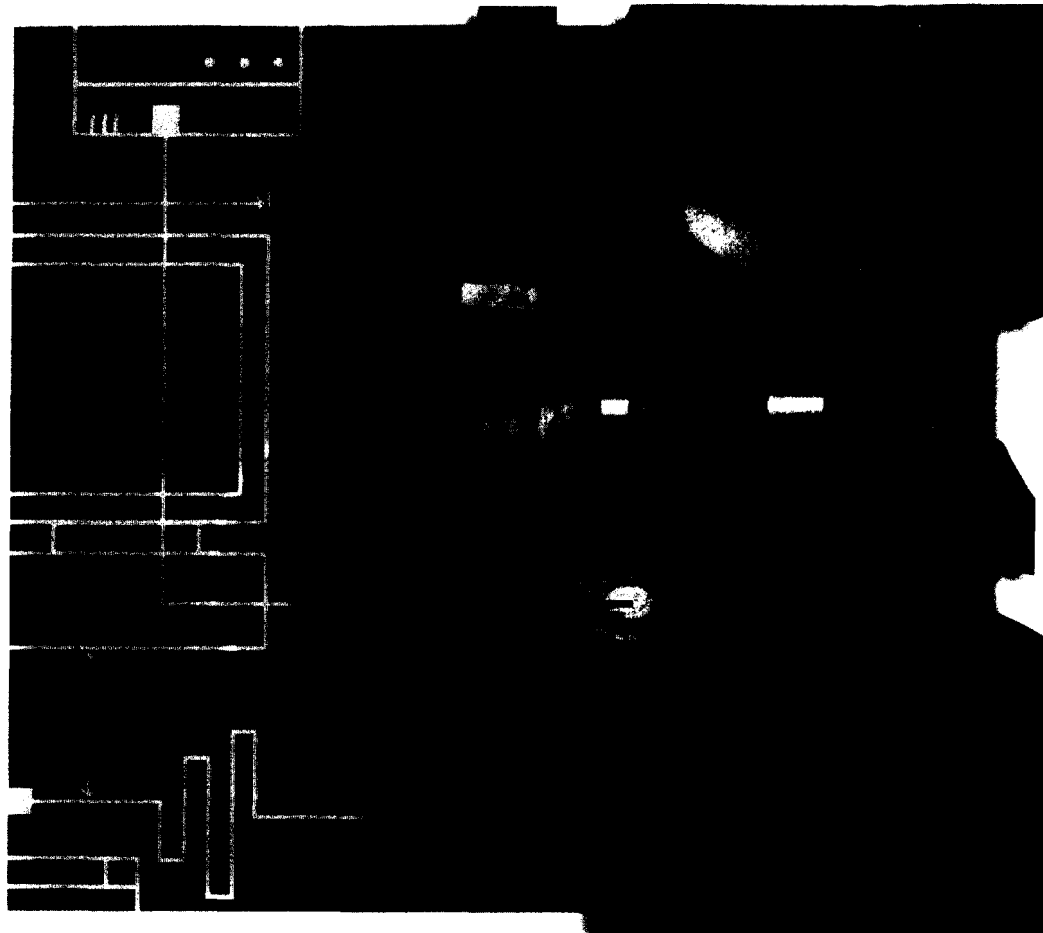
We are not pro phone company and anti-Internet. We believe that we are simply realists. There is no free lunch. You want lower taxes and you want better pay. You want free phone calls, and now you want free long-distance calls as well. Why should you be entitled to all of these things when the rest of us have to pay as we go? What makes those of you who think the 'Net is a scheme for free access to information, software, and now voice communications think that you are better than the rest of us. Don't you understand that unless companies make money they go out of business?

Our advice is to work with the phone companies, service providers, and users. Find a way for everyone to win. Let the local phone companies have the right to charge usage "hogs" a premium (as with electric usage where the per-kilowatt cost of our electric power *increases* the more kilowatts we use). Leave the long-distance voice traffic to those who have been approved to carry it, and use the Internet for whatever you need it for. But realize that someone has to pay for your access. If it isn't you, why should it be us? ■

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# PLEASE HOLD FOR NEW TECHNOLOGY

The basic science is  
in hand; costs are not

## Special Report

**D**onald Green spends his days selling the kind of high-speed communications gear that is helping pave the Information Superhighway. But at night, when he tries surfing the Internet from his home in Santa Rosa, Calif., he finds that the out-of-date phone circuits serving his town, 50 miles north of San Francisco, won't let his modem go any faster than 2,400 bits per second—too slow to make Net cruising worthwhile. So, says Green, when he hears that the I-way is just around the corner, “I kind of laugh a little. You have to recognize the limitations of capital and existing plant.”

Limitations? In the New Age of telecommunications? But weren't microchips and optical

fibers supposed to make all of these little problems go away?

Not quite. Sure, the science for the I-way is well in hand. In March, for example, three labs announced that they had managed to pump 1 trillion bits of data per second over a single hair-thin optical fiber. That's enough to carry 12 million simultaneous conversations—or download 100 two-hour movies in a second. For the airwaves, companies such as Analog Devices Inc. in Norwood, Mass., are developing chips for cellular-phone base stations that can understand calls in any format just by switching to the right decoder program. They call it “software radio.”

But paying for this kind of technology is another matter. Time after time, communications companies that sketched out bold plans for extending advanced digital networks to consumers have retreated when it became clear that they could not do so profitably.

Case in point: Around 1990, the phone companies were going to snake an optical fiber to every home. But that would have cost well over \$1,000 per home. So they decided to extend fiber only partway and use coaxial cable for the rest. By last year, that, too, seemed a bit rich, so a few phone companies began thinking of wringing higher speeds out of their existing twisted-pair copper wiring, which they would leave in place for the “last mile” to the home.

Cable operators got cold feet, too. Two or three years ago, they announced plans to install millions of digital set-top boxes. Most of those plans have been cancelled or postponed as the operators began to realize how much it would cost to buy the boxes and upgrade their networks to use them. Some operators would have to boot analog channels off the air to make room for digital, angering viewers. Now, Scientific-Atlanta Inc. has cashed in on the resistance to digital by selling more than 900,000 “advanced analog” boxes that enable such features as extra-informative program guides. They cost operators \$150 to \$200, vs. more than \$500 for a digital box.

**CHEAPWARE.** Lately, cable operators have de-emphasized interactive television—a costly scheme that depends on banks of computers and disk drives to serve up movies and home shopping. Instead, they're jumping on the Internet, ordering speedy cable modems. But those will require upgrades of cable systems, too.

The technology retreat, however, may be ending. The cost of cutting-edge gear such as the optoelectronic components for fiber networks is dropping. And now that the deregulation bill

## Special Report

has passed, companies have a far clearer picture of where they can invest in such technology and expect a profit.

For example, prices are falling for high-speed data connections to the home—higher-speed ones, anyway. Donald Green, the Santa Rosa resident with the bad phone line, is chief executive of Advanced Fibre Communications in

Petaluma, Calif., which sells boxes that bring digital signals closer to rural homes. Typically, rural phone systems have long runs of wire between switches and homes. That distance wreaks havoc with high-speed communications signals.

Using Advanced Fibre's device, which costs \$4,000 plus \$150 per line, phone companies can upgrade rural lines so customers can use high-speed modems or subscribe to ISDN (integrated services digital network), a data service that operates at 128 kbps.

Meanwhile, companies such as Aware Inc. of Bedford, Mass., are pushing technology that would let phone companies squeeze more capacity out of existing twisted-pair phone wiring. Asymmetric digital subscriber line (ADSL) sends megabits of data over ordinary twisted-pair phone wiring by exploiting frequencies as high as 1 million cycles per second. Signals on copper wires lose power rapidly at those frequencies, so ADSL requires sensitive signal-detection chips. Aware uses detection methods it developed for the U.S. military and spy agencies. To hedge its bets, it is testing versions that work over coaxial cables. Says CEO Jim Bender: "We're supplying armament to both sides."

**DATA BROWNOUTS.** Of course, once the high-speed capacity is in place, people are sure to use it. Even now phone companies are beginning to see that the Info Highway is going to be a lot like the concrete kind—the more you build, the more people will get on, and the more traffic congestion will result.

Already, the explosion of Internet use has pointed up the shortcomings of a phone system designed for voice calls when the online crowd plugs in. Pacific Bell, for instance, offered ISDN service with no per-minute charge on weekends, only to learn too late that Web surfers who use it to reach their Internet access

providers tend to stay on for hours.

To keep Internet traffic from knocking voice callers out of the box, Pac Bell and others are having to spend hundreds of millions of dollars beefing up their switches and the trunk lines between them. The phone companies see asynchronous-transfer-mode switches as their ultimate salvation. For efficiency, ATM breaks messages into packets and stuffs data packets into the spaces between voice and video packets. But with so much invested in their conventional switches, phone companies are likely to keep voice calls on those devices for years to come.

The Net has its own technical limitations. To

cope with exponential traffic growth, companies and Internet operators keep adding routers—specialized computers that read packets' addresses and send them on their way. But that means that a message or a Web page may have to hop through 20 or more routers to reach its destination. Routers can spend more time figuring where to pass the hot potato of a packet than doing the actual passing.

That's one cause of Internet "brownouts," in which response times become intolerably long. NetStar Inc. of Minneapolis is pushing a solution: an Internet redesigned for fewer, more powerful routers, so packets take fewer hops. Something has to change, says Mark E. Garver, NetStar's vice-president for sales and marketing: "The U.S. Internet is about as reliable these days as

the phone system in Russia."

Those are hardly the only hurdles. There's also security and the ability of diverse networks to work together. For the phone companies, one of the biggest problems is their antiquated computers for call-handling, maintenance, billing, and the like. It costs a company such as Nynex Corp. some \$200 million to \$300 million a year simply to maintain mainframe software programs, which are in some cases decades old. The way it's stored now, a phone company's treasure trove of data on customers is largely inaccessible.

That problem, like the others, will eventually be solved because there's an economic incentive to solve it. But only when the pain of inaction becomes greater than the pain of action.

By Peter Coy in New York

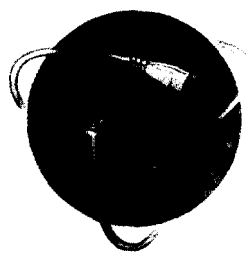
## Building the I-Way: Why Technology Matters

*It may be decades before every home is wired with fiber optics. Until then, engineers are struggling to make the best out of lower-capacity technologies. Here's what makes it so tough:*

**TWISTED-PAIR** Physics puts a cap on how quickly you can pump signals through a pair of narrow-gauge copper wires. Asymmetric digital subscriber line (ADSL) technology can send 8 megabits per second to the home and 640 kilobits back. But the necessary electronics cost over \$1,000—and any loose wiring seriously degrades the speed.

**COAXIAL CABLE** These TV systems were built for broadcast, not interaction. They need new amplifiers that work in both directions. The frequencies available for data and phone calls are the low ones that are most susceptible to electromagnetic static—say, from your vacuum cleaner.

**WIRELESS** Digital cellular networks can't handle heavy-duty data or video, so they won't suffice as the lone pipeline to the home. For antennas in the sky, satellites are great for broadcasting television. But fitting them to handle lots of two-way communication is immensely expensive.



The Net is  
"about as  
reliable these  
days as the  
phone system  
in Russia"

# Storm Ahead

Telephony? T1s delivered via satellite at less than wireline cost? Wave division multiplexers supplanting SDH instead of HFC? Wireless loop? Attached equipment vendors.

*Tumolillo*

...recently passed and signed... however hazy, for head-to-head competition in telephony and cable television. This enables interexchange carriers, competitive access providers, resellers, virtual phone companies and satellite providers to deploy new, innovative technology and less expensive services—placing intolerable pressures on the landline carriers. The economics of any service under competitive free-for-all entry forces a downward spiral on pricing and pressure to reduce both human and equipment costs.

The new entrants are not going to deploy 10,000 class five switches to replicate the phone network. They realize that phone companies have locked themselves into being high-cost providers through careless and needless investment in underutilized and technologically obsolete equipment.

A number of fundamental shifts in technology have the potential for completely overturning carrier networks. These technologies are not all delivered by today's entrenched telecom and cable TV equipment vendors and this signals a major shift in what sector of the industry assumes the mantle of "network designer."

Wireless, computer and optical technologies are going to ripple through traditional equipment markets and force a fundamental realignment of the equipment industry.

## Wireless Technology

DBS and MMDS, satellites in the 28GHz range, wireless loop and PCS low earth orbit satellites will reduce network capital costs to so much rubble. Wireless loop attacks the copper loop of telcos and has the potential of moving almost all of today's traffic off telco networks. Eliminating the loop may eventually force telcos to cede customer control to the more nimble wireless providers and focus solely on transport—the very plan envisioned by Rochester Telephone in its proposal to the New York State PSC for giving up the monopoly in Rochester.

Satellites in the 28GHz geo-synchronous orbit slots planned for launch in 1998-2000 truly will have awesome

capacity. NetSat 28, based in St. Louis, intends to launch a satellite with as many as 500,000 T1s capacity. Operating costs are nil—allowing the sale of T1s at rates an order of magnitude less than wireline carriers. How does a carrier compete with that?

Force	Consequence
Server Telephony	Computer Industry Eliminates the Circuit Switch Mainframes
Internet	Alternative Voice and Data Network at Vastly Lower Tariffs; Computer Industry as Lead Designer
DBS	At \$5/Home Passed, Landline CATV Cannot Complete in Entertainment
MMDS	Telco Solution to Broadcast Entertainment
28GHz Satellites	2-Way T1s at Less than \$10/month in Residential Market—Say Good-bye to ISDN, ADSL, HDSL and to CATV's only Advantage in Network Wars—Bandwidth
WDM	Wipes Out the "Bigger is Better" Mentality in Transmission
PCS Wireless Loop	Obsolesces Much of Telco Outside Plant; LEOs Erode the Transport Platform

**Technology Forces Reducing the Capital Intensity of Carrier Networks**

DBS and, to a lesser extent, MMDS will wipe out much of cable's premium programming, dramatically weakening this sector. A weaker cable industry will, of course, challenge the telcos for interactive services and telephony. But more satellites are planned beyond NetSat 28's—as many as 65 will be launched by the turn of the century by at least 14 companies and all targeted at interactive services. Of these 65 satellites, many will provide service to the continental U.S. and several will provide international coverage.

## Optical Technology

Not only are optical technologies currently producing enormous economies in transmission, the potential for further dramatic reduction in unit costs are achievable simply by shifting to wave division multiplexing. WDM, using new and efficient optical components, such as optical switches, will be simpler and cheaper than today's opto-electronic gear. Telcos, if they hope to reduce costs of delivering broadband services, must be relentless in

writing the most potent statement of intent. WDM's exercise in efficiency was a network in Pennsylvania. In a series of tests, Probe and eight other companies, a series of network hubs were deployed, in which switching and transmission equipment were to be located. The transmission equipment required to serve only the voice and low-speed data traffic in one hub was 8 OC-48 muxes and 20 OC-12s. WDM serving the exact same traffic levels eliminated all of the OC-48 gear and 15 of the 20 OC-12 muxes, a potential savings of millions of dollars.

Company	Bandwidth (in MB/s)
AT&T	1000
Loral Aero	1000
Lockheed Martin	500
NetSat28	1000
Hughes Communications	1000
GE Americom	632
Motorola	750
EchoStar	500
KaStar Sat Comm	500
PenAmSat	1000
TRW, Inc.	n/a
Morning Star Sat Co.	400
Orion Atlantic	1000
VisionStar, Inc.	1000

Satellite Applicants - 28Ghz Range for Interactive Services

## Computer Technology

Perhaps the most breathtaking advance in telephony and cable services is the advent of server telephony. Today's LEC networks are industrial-era networks, designed at a time of monopoly service and protections, and with the idea that more is better. These networks were designed by traditional switch manufacturers, with Bellcore playing more of a role in setting standards and, more importantly, the development of AIN.

The carrier business is at a fundamental divide. The computer industry is poised to march into telephony, build server-based networks and wrest control of network evolution away from traditional switch manufacturers. The server approach (shown p. 28, Figure 1) is vastly less expensive and vastly more flexible than today's circuit-switched world. An entire LATA can be served by a small number of servers, where today scores, if not hundreds, of switches serve the voice and data markets.

Multiplexing Technology	Multiplexing Method	Switching Method
4	Statistical	ATM
3	SONET/SDH STM (TDM)	Time Slot Assignment/Time Slot Interchange
2	WDM	Optical
1	Space Division	Optical

Source: Probe Research, SONETECH

Wave division multiplexing adds another layer of muxing between space division and time division. WDM is based on a complete optical path rather than opto-electronic gear characteristic of today's SONET gear. WDM is inherently less capital intensive than SONET.

A server—a fault tolerant computer—can be provided by several leading edge companies, such as Tandem, Stratus or IBM. The operating system software would be open, allowing a massive infusion of applications into the network, since carriers would no longer be bound to traditional switch manufacturers' software schedule. Even today, the real action is in intelligent peripherals, rather than in the switch, and this is a world where IBM, Tandem, Oracle and others hold sway.

The server model uses loop carriers, supporting Bellcore's GR-803 specs, as the distributed switching units. These loop carriers are modified with tone plant, ringing supply and new software. They are linked via SONET rings to the CO, which now can be many miles distant to a server. The server manages call setup, applications and links to other networks. Virginia-based SONETECH is one of several companies elaborating on this approach in great detail and is now actively building partnerships with loop carrier companies and the computer industry to move to prototype stage within a year.

Traditional switch manufacturers are not sitting still, of course. They believe the server world is at hand and plan to counter attack. They would like the class 5 switch to evolve to being the server. "Yeah, the world is going server and we'll make the DMS the server," says a Nortel executive.

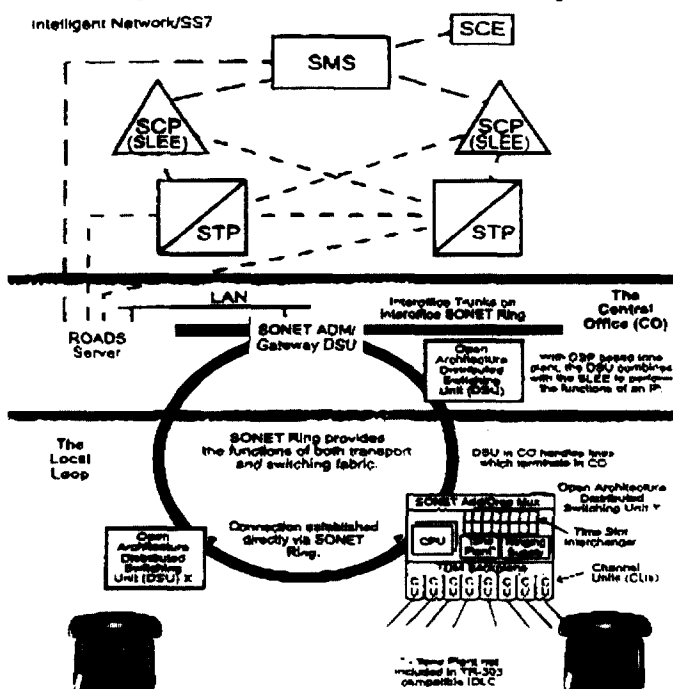
SONET vs. WDM in the Network Subtended from One Regional Hub in the FiberSpan Pennsylvania

MUX Size	No. SONET Only Muxes	SONET Muxes w/WDM Layer	Net Reduction in Muxes
OC-48	8	0	8
OC-12	20	5	15

Source: Probe Research, SONETECH

The data in this table is derived from an engineering and feasibility study conducted by Probe for FiberSpan Pennsylvania, a coalition of cable operators and utility companies in Pennsylvania.

**Figure 1**  
**The Server Approach to Telephony**  
**Eliminating the Switch in Favor of**  
**Robust Open Architecture Distributed Switching Models**



Source: SONETECH, in Probe's "The ROADS Model, the Advent of Client Server Telephony."

In the ROADS approach to LEC networks, the CO switch is replaced by a server in the CO and by upgraded and augmented IDLCs. The IDLCs have tone plant introduced, ringing supply and software, which transforms them into distributed switching units (DSUs) linked to the server over the SONET Ring. The server has an open operating system, thus breaking with the proprietary nature of today's switching systems.

The real problem for traditional switch manufacturers is the software business. These providers are really software companies because 70 percent of the cost of a switch is software development. These development costs are recouped through endless software upgrades—the generics—on each of 10,000 class 5 switches. This is a huge, proprietary business, and quite lucrative. The server model, however, is predicated on open interface to the operating system so that any application developer can provide software. And there are fewer servers anticipated than class 5 switches. The economics work against traditional switch manufacturers in a server world.

## LEC Spending Habits: the Days of Wine and Roses Are Over

The RBOCs were very much behind the federal legislation. For them, long distance is the key market, even more so than cable television. Their entry into long distance service and the existing IXC's declaration of war on the local exchange will unravel the access charge regime, a cash cow of immense importance to landline telcos.

In the 11-year period of 1984 through 1994, the seven Baby Bells generated \$729 billion in revenues solely from landline telephone companies. Access charges paid by IXCs accounted for \$219 billion, or roughly 30 percent of all operating company revenues.

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equipment vendor margins and sales—even with no major technological breakthroughs.

### The Telco CFO's Point of View

Lest anyone think this idle speculation, let's examine the problem from chief financial officer's point of view. The CFO of a major independent telco examined the contributions to value made by each of the four major divisions within the holding company. The four divisions were: wireline telco, cellular, paging and PCS. The CFO pegged the contribution to stock price at: telco, 23 percent of the consolidated stock price per share; cellular, 66 percent; paging, 3 percent; and PCS, 8 percent. The telco operations have about 75 percent of the assets and most of the cash flow, yet its contribution to value is a miserable 23 percent.

The CFO's problem is simply put. Going forward, every dollar spent in the landline telco will generate less value than a dollar spent on wireless service. Yes, telcos generated the cash flow to launch wireless—but in the future, wireless will grab the business and the telco will erode.

### The Future

While Wall Street may not properly value any telecommunications company, CFOs do look to the Street and will be a force to be reckoned with as competition rolls out. They view maintenance of stockholder value as supremely important and this will strongly influence short-term strategy considerations. The present view within many telcos is that the landline business has reached a high-water mark and future growth is in other businesses—interexchange and wireless. Certainly this was the view at Pacific Telesis when it spun-out AirTouch and many top officers went with AirTouch. Landline market shares inevitably will decline; price cuts will be mandatory; simply to hold market share.

The equipment vendors tied to both the telcos and the cable operators will see massive long-term contraction of the core business. The landline business is facing a major restructuring which will ripple through the equipment industry as well. The new communications businesses are not dollar-for-dollar substitutions, thus the battle for the equipment vendor is managing entry into new

equipment businesses, price cutting to maintain shares in a dwindling environment and downsizing.

AT&T's divestiture of Lucent is a verification of this dilemma. The growth is in interexchange and wireless; the decline is in equipment. Better to spin it out than to let it drag down the source of value in the future. X

*Allan Tumolillo is senior vice president and chief operating officer of Cedar Knolls, N.J.-based Probe Research Inc., an internationally recognized leader in strategic analysis on the telecommunications and information industries. He can be reached at (201) 285-1500.*

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## **CERTIFICATE OF SERVICE**

I, Joan M. Stewart, a secretary in the law offices of Helein & Associates, P.C., do hereby state and affirm that copies of the "Initial Comments of America's Carriers Telecommunications Association" in Rulemaking No. 8775, were served in the manner indicated, this 8th day of May 1996, on the following:

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Joan M. Stewart



Networking

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## CallPath and DirectTalk Product Catalog

### Voice processing products: DirectTalk

DirectTalk is a flexible voice processing environment that allows you to build, execute, and manage a wide range of integrated applications. Whether your requirements include database information access (using databases in one or more computing environments), voice messaging, speech recognition, outbound dialing, audiotex information retrieval, fax, pager, automated attendant, or a combination of these, IBM's DirectTalk can be the foundation for your solution. DirectTalk runs either on a personal computer using OS/2, or on a RISC System/6000 workstation using AIX.

### Voice mail product: DirectTalkMail

DirectTalkMail is a fully functional voice mail application, implemented using DirectTalk/6000.

### Call processing products: CallPath

These products provide a robust application programming interface (API), implementing CallPath Services Architecture, that integrates telephony functions and information into existing or new business applications. This API is available on a variety of computer platforms, including AIX, OS/2, HP-UX, Sun Solaris, SCO UNIX, MVS, AS/400, and Windows. CallPath applications can provide functions such as: intelligent answering; coordinated voice/data transfer, consultation, and conferencing; computer-assisted dialing and routing; management information and reports; and workstation control of phone features.

### Call processing applications: CallCoordinator

CallCoordinator is a family of CallPath applications running on MVS, OS/2, or Windows. These applications integrate telephony into existing applications by implementing many of the CallPath functions listed above.

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## Networking

# IBM Software Allows Phone Messages to be Retrieved Via Internet World Wide Web

SOMERS, N.Y., November 28, 1995 . . . Now it's possible to check phone messages from the Internet's World Wide Web with new software from IBM. Voicemail users can now listen to, delete and save their messages directly from their computers using web browsers such as those in the IBM Internet Connection family.

With the new IBM DirectTalkMail software, it's possible to check phone messages from either a computer or phone providing users with more choice and flexibility. Here are some likely scenarios:

- ☐ It's possible to be on a phone call while another call comes in, then check to see who has called without interrupting the current call.
- ☐ While traveling, business executives can use the one available phone line in a hotel room to connect their computers, then check for e-mail and phone messages at the same time.
- ☐ Those who work at their computers most of the day may find it more convenient to check phone messages from the computer screen. Or, those who don't want to tie up their phone line for incoming calls can check for new messages directly on the computer screen.

Anyone can try the new IBM DirectTalkMail software. It's easy. Instructions for the trial can be accessed at the World Wide Web address, <http://www.hursley.ibm.com/dtmail>. As part of the trial, you will be required to make a call and leave a message at the IBM laboratory in the U.K. where the software was developed. The length of your call depends on the length of your message. Within minutes, you can retrieve your own message from the World Wide Web and hear your own voice without having to pick up the telephone.

DirectTalkMail, a new voice messaging feature of IBM's DirectTalk/6000 voice response software, is suitable for organizations that require a few hundred voicemail boxes or a few thousand. It allows users to be notified of incoming voice messages via electronic mail, phone, or pager.

In addition, users of IBM DirectTalkMail can send messages to users of another voice messaging system, provided that it supports the Audio Messaging Interface Standard (AMIS).

Today's announcement is another example of IBM's network-centric computing strategy -- IBM's plan to enable people to receive, use and share applications and services across worldwide voice and data networks.

## New DirectTalk Software

The new release of DirectTalk/6000 (Version 1, Release 6) announced today includes the DirectTalkMail option. The family of DirectTalk voice response software products enable access to information via the telephone. For example, banks can provide account balance and rate information, manufacturers can provide order, shipping and warranty information, and universities can offer course availability and schedule information.

With the new release comes speech recognition technology so that users can access information by

simply by saying their name, without having to enter account numbers on a telephone. The speech recognition also provides security for calls placed over cellular connections since the user's voice and speech are recognized and no account numbers have to be entered.

The new release of DirectTalk will be available February 2, 1996. The software runs on the IBM RISC System/6000\* using the AIX\* operating system.

IBM, the world's largest software provider, is a leading solutions provider for integrated voice/data solutions in the industry. These total systems solutions are backed by IBM service and support.

To learn more about DirectTalk/6000, release 6, as well as about IBM's other voice/data offerings, contact your IBM representative or authorized reseller. In the U.S. call 800-426-4211 extension 149. Outside the U.S., call +44-1962-840018.

For Internet users, IBM offers complete information about the company, its products, services and technology on the World Wide Web. The [IBM home page](http://www.ibm.com) is at <http://www.ibm.com>. The fastest, easiest way to get information about IBM software is to go to the [IBM Software home page](http://www.software.ibm.com) at <http://www.software.ibm.com>. For more information about today's announcement, go to the [IBM computer telephony home page](http://www.raleigh.ibm.com/cti/ctiover.html) at <http://www.raleigh.ibm.com/cti/ctiover.html>.

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## Voice mail via the Internet

### New feature on IBM DirectTalk Voice Response System

Now it's possible to check phone messages via the Internet's World Wide Web with a new feature on IBM's DirectTalk Voice Response System. Voicemail users can scan, listen to, delete and save their messages directly from their computers using standard Web Browsers such as NetScape or IBM's WebExplorer.

Why would anyone want to do this? Isn't it easier to check phone messages from a phone, and not a computer? Well, the answer is not necessarily. Consider the following scenarios:

- You have received a lot of voice messages, but you want to scan the messages quickly to find one from a key client. This is difficult to do over a 'phone, but it's a simple task using a graphical computer interface.
- You are at a hotel room with one available phone line. You can connect your computer and check for phone messages at the same time. Alternatively, why not download the voice messages into your computer and review them at your leisure - all for the cost of a local call?
- Because you work at your computer most of the day, you find it more convenient to check phone messages from the computer screen. Or, you don't want to tie up your phone for incoming calls by checking for messages so you check from your computer.
- Anyone can try the new IBM DirectTalkMail software themselves. It's easy. Instructions can be accessed at the Home Page of the [IBM laboratory](#) in the UK where the software was developed. In a few minutes, you can retrieve your own message and hear your own voice via the World Wide Web. All you need to do is make a call to the laboratory. The length of your call depends on the length of your message.

DirectTalkMail, a new voice messaging feature of IBM's DirectTalk/6000 voice response software, is suitable for organisations that require a few hundred voicemail boxes or a few thousand. It allows users to be notified of incoming voice messages via electronic mail, phone or pager.

In addition, users of IBM DirectTalkMail can send messages to users of another voice messaging system, provided they support the Audio Messaging Interface Standard (AMIS).

The new offerings underscore IBM's commitment to network-centric computing by allowing the telephone to act as a gateway to the information highway - providing access to business data by more users in more locations.

### New DirectTalk Software

The new release of DirectTalk/6000 (Version 1, Release 6) announced today includes the DirectTalkMail option. The family of DirectTalk voice response software products enable access to information via the telephone. For example, banks can provide account balance and rate information, manufacturers can provide order, shipping and warranty information, and universities can offer course availability and schedule information.

With the new release comes speech recognition technology so that users can access information by simply saying their name, without having to enter account numbers on a telephone. The speech recognition also provides security for calls placed over cellular connections since the user's voice and

speech are recognised and no account numbers have to be entered

IBM Australia's Product Manager for DirectTalk/6000, Geoff Forster, has confirmed that DirectTalk/6000 now has Austel Approval for use in Australia and that this latest release will be available from February 2, 1996.

"This new release of DirectTalk/6000 means IBM is providing the latest voice/data technology to Australian organisations. We are now delivering end-to-end solutions from basic voice response solutions to large complex Call Centres that utilise the latest in Computer-Telephony-Integration", said Geoff.

IBM, the world's largest software provider, is also the leading solutions provider for integrated voice/data solutions. In Australia, for example, Telstra are planning to use DirectTalk/6000 in their Operator Assisted Services. These total systems solutions are backed by IBM service and support.

Further information about DirectTalk/6000, Release 6, and about IBM's other voice/data offerings, can be obtained on the Internet by visiting the [IBM Computer Telephony](#) homepage.

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This page was last updated on December 7, 1995 and can be found at  
<http://www.ibm.com.au/ProdServ/network/dirtalk.html>.

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Networking

# Computer-Telephone Integration Overview

Computer-telephone integration (CTI) combines computer technology and telephone technology to provide better service at lower cost.

There are two flavors of computer-telephone integration:

- ☐ Call processing
- ☐ Voice processing

These are often used together to provide an integrated solution.

---

## Call Processing

Call processing technology enables the computer to work alongside a human agent, helping them to handle calls more smoothly and efficiently.

The most common usage for this technology today is in large call centers handling thousands of calls per day. However, call processing can be used to advantage wherever people use both computers and telephones, whether they work as individuals or together in a "groupware" environment.

Call processing technology is used to provide solutions such as:

- ☐ Intelligent answer (screen pop)
- ☐ Voice and data transfer
- ☐ Route incoming calls based on information in customer database
- ☐ Automate outbound dialling
- ☐ Automate telephony (screen-based telephone)
- ☐ Create call center reports

IBM's CallPath range of call processing products, include both application enablers and fully functional call management applications.

---

## Voice Processing

With voice processing technology, the computer takes the place of a human telephone operator and provides a gateway between the caller and the business information stored on the computer systems.

Voice processing technology is used to provide solutions such as:

- ☐ Automated call answering (automated attendant)
- ☐ Interactive voice response
- ☐ Direct access by telephone to data stored on computers
- ☐ Voice mail

- ☐ Transaction-related voice messaging
- ☐ Automated outbound calling (predictive dialing)

IBM's DirectTalk voice processing products, include both application enablers and a fully functional voice mail application. The DirectTalk products also provide some call processing functions, but for a fully-integrated call management system, they need to be combined with CallPath call processing products.

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What are the benefits of CTI?

## What's New at IDT?

- [IDT PRESS RELEASES](#)
- [IDT IN THE NEWS - RECENT ARTICLES](#)

### IDT PRESS RELEASES

- November 6, 1995**     **IDT TO UNVEIL NET2PHONE AT COMDEX:  
Revolutionary System Uses Internet to Make Overseas  
PC-to-Telephone Calls for 10 Cents a Minute**
- October 23, 1995**     **IDT Announces Major Breakthrough That Will Allow Worldwide  
PC-to-Telephone Calls Over the Internet**
- September 20, 1995**     **Upstart IDT Eclipses Netcom, PSINet and UUNET in Providing Local  
Internet Access Nationwide**

### IDT IN THE NEWS - RECENT ARTICLES

- November 17, 1995**     **THE WALL STREET JOURNAL**  
*Heard on the Street: Rising Internet Stocks Signal Faith in New Era of  
Voice Communications, But Picks Are Slim*
- November 10, 1995**     **THE WALL STREET JOURNAL**  
*Small Phone Company Plans to Slash International Rates with Internet  
Link*
- October 25, 1995**     **INVESTOR'S BUSINESS DAILY**  
*New Technology Lets PCs Call Telephones*
- October 23, 1995**     **BUSINESS WEEK**  
*Bits & Bytes: London Calling on the Cheap*
- October 6, 1995**     **TELECOM '95 DAILY**  
*IDT Joins IP Rush with PC-to-Phone Service*
- October 2, 1995**     **THE INDEPENDENT (London)**  
*Internet Set to Cut Phone Bills*
- September 30, 1995**     **THE TIMES (London)**  
*Internet Opens Way for Cheap Calls to America*

[Home](#) | [Map of Site](#) | [What's New](#)

# A Call to Phones

**W**hen the first Internet telephone hit the market last spring, the response was enormous—at least according to Vocaltec Inc. The maker of the marcurial Internet Phone, Vocaltec claimed 150,000 downloads from its Web site in the first three months of the software's release. The barbarians were at the gate, ready to topple the telco monarchs. A flurry of other, less polished computer-to-computer telephony products followed. Soon enough, folks with iPhones and similar permutations would be barking up and down the Net, and old Ma Bell would have to fall in line with lower long-distance rates. Yet, across jumpy, static-filled connections, it was most often the uncomfortable, fuzzy silence of communication delays that resounded across the ether.

And guess what? A year later, the transmission delay is still there (yes, even in full duplex conversations); and Internet telephony—with all its "hang-ups"—has yet to revolutionize telecommunications. But no matter: International Discount Telecommunications Corp. (<http://www.ios.com/>), a Hackensack, New Jersey, Internet access provider and callback service, is positioning itself to become the first company to market with a computer-to-telephone product early this summer.

The company's Net2Phone software will soon enable users to dial any phone number—straight from their computers. Howard Jonas, Discount Telecommunications Corp.'s president, points out that while the typical international call runs at approximately US\$120 an hour, the figure will be closer to \$6 with Net2Phone. What will telephone companies worldwide say about this? "I'm sure nobody likes it, but there's nothing they can do," he says. "They hated the callback business, too." Jonas pioneered the squirrely and very profitable callback service in 1991, much to the chagrin of

telcos that stood to make money in IDT's place.

International Discount Telecommunications won't be alone in the campaign to cheapen international calls. A project called Free World Dialup (<http://www.pulver.com/fwd/>), which launched in January and will run through April, is accomplishing exactly what its title suggests: providing people with free links from the Net to international phone lines. Jeff Pulver, one of the volunteer organizers of Free World Dialup, says the project is simply an experiment for proof of concept. Pulver, who also moderates the NetWatch mailing list, a discussion group for Internet telephony issues, adds that he wouldn't mind rattling some chains in the process. "It's the spirit of the Net," he says.

Problem is, the Net is also marked by bandwidth limitations that keep Internet telephony quality down—a prime reason telecom execs aren't up at night sweating bullets. Until the arrival of technology that will create real competition, Pulver says, "there's a coolness factor to Internet telephony, and then it just goes away." —Roderick Simpson

[ORIGINAL STORY IN WIRED 3.10, PAGE 140.]

## Promo to Go

Sanford Wallace's Promo Enterprises is in some very hot water. After Promo forged a return e-mail address last October, ReplyNet Inc., a Gaithersburg, Maryland, electronic fulfillment service, found its servers inundated with mail bombs and vituperative rejoinders from irate victims of Promo's mass junk mailing. ReplyNet, fearing permanent damage to its reputation, served Promo a Big Foot letter citing "serious violations of state and federal law." Curiously, Promo had also just launched its own "auto-responder" fulfillment service, begging the question, could this have been a deliberate act of spamotage?

The ensuing case could very well be precedent-setting. "It's the first legal battle over spamming," says Stewart Baker, ReplyNet's senior counsel. "But, it won't be the last."

[ORIGINAL STORY IN WIRED 4.01, PAGE 52.]



## Script (e)X(it)?

Though Kaleida closed its doors as an independent entity on January 16, some predict it will continue its slow, agonizing decline as Apple takes the helm.

While cognitive dissonance between Apple and IBM is frequently cited by ex-employees as a reason for the company's downfall, another pointed to parental neglect. Nat Goldhaber, former head of Kaleida, contends that the seeds of Kaleida's destruction

were sown in its creation. "Kaleida suffered from both a structural and conceptual problem. There were mixed messages and no messages." The parents "wanted a research lab that they could jointly control."

Most agree that a lack of direction at critical junctures foiled the production of a potentially lucrative product. As media team manager Erik Neumann points out, "ScriptX needs care

and feeding. Apple is focused on its bottom line—selling hardware, the success of its OS. Management just won't focus on this." Indeed, ScriptX may very well take a back seat, making it questionable whether 2.0 will ever ship. As one former Kaleida engineer who asked to remain anonymous says, "I don't think Apple has the wherewithal or the smarts to pull it off."

[ORIGINAL STORY IN WIRED 1.2, PAGE 36.]

## What Goes Up

As its system's launch date and US\$3.4-billion price tag loom ever larger, Iridium Inc. finds it still has some serious work to do. Four years after the Washington, DC-based start-up went looking for funds, it has only 50 percent in hand. A junk-bond financing scheme was recently dashed; instead, Iridium will hold a \$300 million internal offering, switching tacks to low-cost equity financing, while also opening itself to foreign investments. (Company spokesperson John Windolph asserts that the foreign investments are "not a financing mechanism.")

With FCC license now in hand, Iridium contends things are running smoothly and ahead of schedule. Whether this is true or not, industry experts believe that Motorola will never let the project die an ungracious death.

As Scott Chase, the publisher of Via Satellite, points out, "Motorola is Iridium's international bank of last resort."

[ORIGINAL STORY IN WIRED 1.5, PAGE 72.]

## ABOUT THE WEBPHONE

WebPhone is the professional real-time Internet telephone which lets you talk as a conventional telephone over the Internet without the cost associated with long distance calls.

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WebPhone 1.0 provides the following features:

- telephone quality real-time speech
  - point to point calling via e-mail or IP addressing (not IRC chat)
  - full duplex operation
  - 4 lines for simultaneous conversations
  - call holding, muting and blocking
  - last party redial
  - complete caller ID
  - speed dialing
  - conversation encryption
  - personal phone directory
  - integrated real-time directory assistance
  - integrated voice-mail system for sending and receiving voice mail
  - party specific, user definable, custom outgoing messages
  - integrated, context sensitive, interactive multimedia user manual
  - user configurable sound effects
  - state of the art software equipment based graphic user interface for simplified ease of use
  - operates on the Internet as well as over any TCP/IP based LAN or WAN
  - and much more...
- 

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# Speak Freely for Windows

## Release 6.1

by John Walker ([kelvin@fourmilab.ch](mailto:kelvin@fourmilab.ch))  
 WWW Home page: <http://www.fourmilab.ch/>

*Speak Freely* is a Windows application that allows you to talk (actually send voice, not typed characters) over a network. If your network connection isn't fast enough to support real-time voice data, four forms of compression may allow you, assuming your computer is fast enough, to converse nonetheless. To enable secure communications, encryption with DES, IDEA, and/or a key file is available. If PGP is installed on the user's machine, it can be invoked automatically to exchange IDEA session keys for a given conversation. *Speak Freely* for Windows is compatible with *Speak Freely for Unix*, and users of the two programs can intercommunicate. Users can find one another by communicating with a "Look Who's Listening" phonebook server. You can designate a bitmap file to be sent to users who connect so they can see who they're talking to. *Speak Freely* supports Internet RTP protocol, allowing it to communicate with other Internet voice programs which use that protocol; in addition, *Speak Freely* can also communicate with programs which support the VAT (Visual Audio Tool) protocol.

**Release 6.1 now available!** This release is a 32-bit application which runs in native mode on Windows 95 and Windows NT. Starting with Release 6.1, *Speak Freely for Windows* will be released only for 32-bit systems. Users of 16-bit Windows 3.x systems can continue to use *Speak Freely* 6.0, which remains available and can communicate with later releases without difficulty.

Release 6.1 includes support for United States Department of Defense Federal Standard 1015 / NATO-STANAG-4198 / LPC-10 compression algorithm, republished as Federal Information Processing Standards Publication 137 (FIPS Pub 137). LPC-10 compression (an algorithm completely different from that the original LPC compression) compresses sound by a factor of more than 26 to 1 with fidelity, albeit less than that of GSM compression, perfectly adequate for voice-grade communications.

The extreme compression achieved by the LPC-10 algorithm allows the option of "robust transmission," in which multiple copies of sound packets are sent, each containing a sequence number which allows the receiver to discard duplicate or out-of-sequence packets. Robust transmission often allows intelligible conversation over heavily loaded network links which would otherwise induce random pauses and gaps in received sound.

**Mailing lists now open!** Two Internet mailing lists devoted to *Speak Freely* are now open to subscribers, one for general unmoderated discussion of all topics related to *Speak Freely* (also available as a periodic digest) and a moderated list reserved for announcements of general interest to the *Speak Freely* user community. Please consult the [mailing list documentation](#) for further details and information on how to subscribe.

**Remote echo servers now available!** Servers are now running at the sites [corona.itre.ncsu.edu](http://corona.itre.ncsu.edu) and [echo.fourmilab.ch](http://echo.fourmilab.ch) which echo back any sound you send ten seconds later, using the same compression and encryption modes as the sound you sent. This lets you experiment with different modes without tying up a person on the other end. *Note:* the [echo.fourmilab.ch](http://echo.fourmilab.ch) server shares its Internet link with the very busy [www.fourmilab.ch](http://www.fourmilab.ch) Web site; as a result, due to outbound traffic you may experience pauses when using this server that you wouldn't encounter otherwise.



**Notice:** A great deal of work has been done to make *Speak Freely* work on as many computer configurations as possible, but given the extraordinary variety and uneven quality of sound cards and drivers, network interfaces, Internet Service Providers, Windows Sockets drivers, etc. in the real world, and the fact that many of these components were not designed and have not been tested for real-time transmission of sound, you may have to do some fiddling with your

configuration to get *Speak Freely* running satisfactorily, and you may discover that with your current configuration you can't get it to work at all. *Speak Freely* uses only standard Windows multimedia and network services, but it pushes them much harder than do most other Internet tools. If the hardware and drivers on your machine do not function according to Microsoft's specifications, there is nothing *Speak Freely* can do about it.

Further, if your network connection isn't sufficiently fast and consistent, and/or your computer doesn't run fast enough to execute this very demanding program in real time, you'll be disappointed with the results. A 486/50 or faster computer with a 28.8 kilobit per second or faster Internet connection is ideal; you can run over a 14.4 kilobit per second Internet connection by using LPC compression. If your computer is fast enough to run LPC-10 compression (a 75 Mhz or faster Pentium is generally required), you can send audio over links as slow as 4800 bits per second. *Speak Freely* is a 32 bit Windows applications which runs under Windows 95 and Windows NT. Earlier versions which run on 16-bit Windows and compatible systems (such as OS/2 Warp) remain available. Just in case I inadvertently broke something in this latest release, executable and source distributions for all prior releases remain available.



## Downloading and Installation

Want to give it a try? First make sure you have the required computer hardware and software at hand. If so, go ahead and download the executable program archive into a directory of its own, unzip the archive with PKUNZIP or a compatible archive extractor, create a new program item with the Program Manager File/New... menu item for the executable `speakfre.exe`, and you're ready to go.

### Download *Speak Freely*

- ☐ *Speak Freely* 6.1 for Windows 95 and Windows NT
- ☐ *Speak Freely* 6.0 for Windows 3.x



### Non-Cryptographic Version

Some governments believe individuals shouldn't be able to have private conversations and attempt to restrict the use, distribution, or export of software that provides communication security through encryption. The standard version of *Speak Freely* includes encryption; if you are worried that using or redistributing such software (for example, placing *Speak Freely* on an Internet site or public bulletin board system) might violate the laws of your jurisdiction, you can obtain a version of *Speak Freely* (nicknamed *Spook Freely*) which has all encryption capability removed. This version tells its users where to obtain a copy with full encryption capability, should they desire to do so.

### Download *Speak Freely* non-cryptographic version

- ☐ Non-cryptographic *Speak Freely* 6.1 for Windows 95 and Windows NT
- ☐ Non-cryptographic *Speak Freely* 6.0 for Windows 3.x



## Source Code

Complete source code is available for *Speak Freely*. *Source code is intended for experienced Windows developers only. You don't need the source code unless you want to modify the program yourself.* If you want to look under the hood, download the source code, which you'll need Visual C/C++ 4.0 (no C++ features are used) to compile. Source code for the last 16-bit release, 6.0, is also available; it was developed using Visual C/C++ 1.52c. To extract the source code, create a directory for it and, in that directory, use the command:

```
pkunzip -d speakfs.zip
```

The "-d" option is *essential*; without it the subdirectory structure in the archive will be lost. Once you've extracted the files, you can use Visual C++ to build all of the libraries in the subdirectories and then build the main program. Assuming the protected mode help compiler, `hpc`, is on your path, typing `make` in the `help` subdirectory will rebuild the help file.

If you decide to experiment with the source code, you're entirely on your own--I do not have the time to provide support to novice developers. *Speak Freely* is a large, complicated, and tricky program which requires a substantial investment in time to learn your way around before you commence any serious development.

## Download *Speak Freely* source code

- ☐ [\*Speak Freely\* 6.1 32-bit source code](#)
  - ☐ [\*Speak Freely\* 6.0 16-bit source code](#)
- 

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# **Introduction**

*Speak Freely* is a Microsoft Windows application that allows you, with [appropriate hardware and software](#), to send and receive audio, in real time, over a computer network. If you're connected to the Internet by a sufficiently high-speed link, you can converse with anybody else similarly connected anywhere on Earth without paying long-distance phone charges. Users can find one another, even if they have dial-up connections to the Internet, by [publishing](#) and [searching](#) directory entries on a Look Who's Listening server. You can [designate a bitmap file](#) to be sent to users who connect so they can see who they're talking to.

*Speak Freely* not only because you aren't running up your phone bill, but also knowing your conversation is secure from eavesdroppers. *Speak Freely* provides three different kinds of encryption, including the same highly-secure IDEA algorithm PGP uses to encrypt message bodies. By using PGP to automatically exchange keys, session you can *Speak Freely* to total strangers, over public networks, with greater security than most readily available telephone scramblers provide.

*Speak Freely* for Windows is 100% compatible with [Speak Freely for Unix](#), currently available for Sun and Silicon Graphics workstations. Windows users can converse, over the Internet, with users of those